Amendments to the Claims:

Please cancel Claims 5, 19, and 20; and amend Claims 1 – 3, 6 – 18, 21 – 24, 27, 29 – 31, 33 – 35, 37 – 39, and 41 as indicated in the following listing of claims, which replaces all prior versions and listings of claims in the application.

Listing of Claims:

1. (Currently Amended) A method of forming an optical waveguide ~~on an undercladding layer of a substrate~~, the method comprising:

flowing a silicon source gas into a process chamber;

flowing an oxygen source gas into the process chamber;

forming a high-density plasma in the process chamber from the silicon source gas and the oxygen source gas;

forming ~~at least one~~ a plurality of separated silicate glass optical cores ~~on said~~ over an undercladding layer disposed within the process chamber with the ~~using a~~ high-density plasma ~~deposition process including a silicon source gas and an oxygen source gas~~, the separated silicate glass optical cores defining a sequence of gaps; and

depositing an uppercladding layer over the plurality of separated silicate glass optical cores,

wherein ~~the~~ each of the silicate glass optical cores is formed with a refractive index ~~of the undercladding layer is less~~ greater than ~~the~~ a refractive index of the ~~optical core~~ undercladding layer.

2. (Currently Amended) The method of claim 1 ~~wherein the high-density plasma process comprises~~ further comprising maintaining a pressure ~~of~~ within the process chamber less than 100 millitorr while forming the silicate glass optical cores, wherein forming the high-density plasma comprises providing energy to the process chamber inductively with ~~and~~ an RF ~~energy~~ power density greater than 3 Watts/cm^2.

3. (Currently Amended) The method of claim 2 ~~wherein the high-density plasma process further comprises~~ further comprising flowing a nitrogen source gas into the

process chamber, wherein forming the high-density plasma comprises forming the high-density plasma from the silicon source gas, the oxygen source gas, and the nitrogen sources gas, whereby ~~and~~ the plurality of optical cores comprise~~s~~ silicon, oxygen, and nitrogen.

4. (Original) The method of claim 3 wherein the nitrogen source gas is molecular nitrogen.

5. (Canceled).

6. (Currently Amended) The method of claim 3 wherein the oxygen source gas and silicon source gas are flowed to provide a ratio of oxygen atoms to silicon atoms ~~is~~ in the high-density plasma greater than 3:1.

7. (Currently Amended) The method of claim 3 wherein the silicon source gas comprises silane, the oxygen source gas comprises molecular oxygen, and the nitrogen source gas comprises molecular nitrogen.

8. (Currently Amended) The method of claim 7 wherein the ~~ratio of~~ molecular oxygen is flowed into the process chamber at a rate ~~to silane is~~ greater than 1.5~~:1~~ times a rate at which the silane is flowed into the process chamber.

9. (Currently Amended) The method of claim 7 wherein the molecular oxygen ~~source~~ is flowed into the process chamber at a rate ~~is~~ between ~~200-600~~ 200 and 600 sccm.

10. (Currently Amended) The method of claim 7 wherein the ~~ratio of~~ molecular nitrogen is flowed into the process chamber at a rate ~~to silane is~~ between 0.5 and 5.0 times a rate at which the silane is flowed into the process chamber.

11. (Currently Amended) The method of claim 7 wherein the molecular nitrogen ~~source~~ is flowed into the process chamber at a rate ~~is~~ between ~~300-500~~ 300 and 500 sccm.

12. (Currently Amended) The method of claim 1 further comprising maintaining ~~wherein the high-density plasma process is carried out at~~ a temperature within the process chamber while forming the silicate glass optical cores ~~of~~ greater than 600°C.

13. (Currently Amended) The method of claim 1 wherein each of the silicate glass optical cores comprises a phosphorus doped silicate glass optical core or germanium doped silicate glass optical core.

14. (Currently Amended) The method of claim 1 wherein each of the optical cores has a ~~the~~ contrast relative to ~~between the refractive index of the core and the refractive index of~~ the undercladding layer ~~is~~ greater than 2%.

15. (Currently Amended) The method of claim 1 wherein forming ~~at least one~~ the plurality of optical cores comprises:

depositing a substantially continuous optical core layer on the undercladding layer ~~using said~~ with the high-density plasma ~~deposition process~~; and

etching the sequence of gaps within the ~~continuous~~ optical core layer to form the ~~at least one~~ separated optical cores,

wherein depositing the uppercladding layer comprises depositing the uppercladding layer within the gaps.

16. (Currently Amended) The method of claim 15 wherein forming the plurality of separated optical cores is performed without applying ~~the depositing using said high-density plasma deposition process does not use~~ an RF bias to the undercladding layer.

17. (Currently Amended) The method of claim 1 wherein forming ~~at least one~~ the plurality of optical cores comprises:

etching ~~at least one~~ a plurality of trenches in the undercladding layer; and

depositing silicate glass within each of the ~~at least one optical core in the corresponding at least one~~ trenches ~~using said~~ with the high-density plasma ~~deposition process~~; ~~and~~

~~depositing an uppercladding layer over the at least one optical core~~.

18. (Currently Amended) The method of claim 17 wherein ~~the~~ depositing silicate glass within each of the trenches comprises applying ~~using said high-density plasma deposition process does includes~~ an RF bias to the undercladding layer.

19. – 20. (Canceled).

21. (Currently Amended) The method of claim 1 further comprising annealing the ~~at least one~~ plurality of optical cores ~~after the high-density plasma deposition process~~.

22. (Currently Amended) ~~A~~ The method of claim 1, further ~~depositing an optical core on a substrate in a processing chamber~~ comprising:

flowing a dopant source gas into the process chamber; and

maintaining ~~establishing~~ a pressure of less than 100 millitorr in ~~said~~ the process~~ing~~ chamber[[;]], wherein:

forming the high-density plasma comprises providing energy to the process chamber inductively with ~~generating~~ an RF power density ~~of~~ greater than 3 $Watts/cm^2$ and forming the high-density plasma from the silicon gas source, the oxygen gas source, and the dopant gas source; and

~~providing a silicon source gas, an oxygen source gas, and a dopant source gas in said processing chamber, wherein~~ the dopant source gas ~~increases~~ causes each of the plurality of optical cores to have a ~~the~~ refractive index ~~of said optical core~~ above 1.46.

23. (Currently Amended) The method of claim 22 wherein the oxygen source gas and silicon source gas are flowed to provide a ratio of oxygen atoms to silicon atoms ~~is~~ in the high-density plasma greater than 3:1.

24. (Currently Amended) The method of claim 22 wherein the dopant source gas is a nitrogen source gas, whereby ~~and~~ the optical core comprises silicon, oxygen, and nitrogen.

25. (Original) The method of claim 24 wherein said nitrogen source gas is molecular nitrogen.

26. (Original) The method of claim 25 wherein the silicon source gas is silane.

27. (Currently Amended) The method of claim 26 wherein the ~~ratio of~~ molecular nitrogen is flowed into the process chamber at a rate ~~to silane is~~ between 0.5 and 5.0 times a rate at which the silane is flowed into the process chamber.

28. (Original) The method of claim 22 wherein the dopant source gas is a phosphorus containing gas or germanium containing gas.

29. (Currently Amended) A substrate processing system comprising:

a housing defining a process chamber;

a high-density plasma generating system operatively coupled to the process chamber;

a substrate holder configured to hold a substrate during substrate processing;

a gas-delivery system configured to introduce gases into the process chamber, including sources for a silicon-containing gas, an oxygen-containing gas, and a dopant-containing gas;

a pressure-control system for maintaining a selected pressure within the process chamber;

a controller for controlling the high-density plasma generating system, the gas-delivery system, and the pressure-control system; and

a memory coupled to the controller, the memory comprising a computer-readable medium having a computer-readable program embodied therein for directing operation of the substrate processing system to form an optical ~~core a substrate~~ waveguide, the computer-readable program including:

instructions to flow a gaseous mixture containing flows of the silicon-containing gas, the oxygen-containing gas, and the dopant-containing gas into the process chamber;

instructions to maintain a pressure of less than 100 millitorr within the process chamber; and

instructions to form a high-density plasma in the process chamber from the gaseous mixture by providing energy to the process chamber inductively with ~~provide~~ an RF power density greater than 3 Watts/ cm^2;

instructions to form a plurality of separated silicate glass optical cores over an undercladding layer disposed within ~~into~~ the process chamber with the high-density plasma~~, and in accordance therewith, generate a high-density plasma from the gaseous mixture and deposit a doped silicate glass optical core~~, wherein:

the separated silicate glass optical cores define a sequence of gaps; and

the dopant-containing gas ~~increases the~~ causes each of the plurality of optical cores to have a refractive index ~~of said optical core~~ above 1.46 and greater than a refractive index of the undercladding layer; and

instructions to deposit an uppercladding layer over the plurality of separated silicate glass optical cores.

30. (Currently Amended) The substrate processing system of claim 29 wherein the instructions to flow the gaseous mixture include instructions to flow the oxygen-containing gas and the silicon-containing gas to provide a ratio of oxygen atoms to silicon atoms ~~is~~ in the high-density plasma greater than 3:1.

31. (Currently Amended) The substrate processing system of claim 29 wherein the dopant-containing gas comprises a nitrogen-containing gas, whereby ~~and~~ each of the plurality of optical cores comprises silicon, oxygen, and nitrogen.

32. (Original) The substrate processing system of claim 31 wherein the silicon-containing comprises silane and the nitrogen-containing gas includes molecular nitrogen.

33. (Currently Amended) The substrate processing system of claim 32 wherein the ~~ratio of~~ instructions to flow the gaseous mixture include instructions to flow the molecular nitrogen into the process chamber at a rate ~~to silane is~~ between 0.5 and 5.0 times a rate at which the silane is flowed into the process chamber.

34. (Currently Amended) The substrate processing system of claim 29 wherein the substrate holder comprises an electrostatic chuck, and wherein computer-readable program further includes instructions for turning the electrostatic chuck off during deposition of the plurality of silicate glass optical cores.

35. (Currently Amended) The substrate processing system of claim 29 further comprising a top RF source and a side RF source, wherein the instructions to form the high-density plasma include instructions to provide energy to the process chamber inductively with the top and side RF sources, with a ~~the~~ ratio of power ~~of~~ provided by the top RF source to power provided by the side RF source ~~is~~ being between 0.21 and 0.73.

36. (Original) The substrate processing system of claim 29 wherein the dopant containing gas is a phosphorus containing gas or germanium containing gas.

37. (Currently Amended) A computer-readable storage medium having a computer-readable program embodied therein for directing operation of a substrate processing system including a process chamber; a plasma generation system; a substrate holder; and a gas delivery system configured to introduce gases into the process chamber, the computer-readable program including instructions for operating the substrate processing system to form an optical ~~core on a substrate disposed in the processing chamber~~ waveguide in accordance with the following:

flowing a silicon source gas into the process chamber;

flowing an oxygen source gas into the process chamber;

flowing a dopant source gas into the process chamber;

~~establishing~~ maintaining a pressure of less than 100 millitorr in ~~said~~ the processing chamber;

forming a high-density plasma in the process chamber from the silicon source gas, the oxygen source gas, and the dopant source gas by providing energy to the process chamber inductively with ~~generating~~ an RF power density ~~of~~ greater than 3 Watts/cm^2;

forming a plurality of separated silicate glass optical cores over an undercladding layer disposed within the process chamber with the high-density plasma, wherein:

the separated silicate glass optical cores define a sequence of gaps; and

~~providing a silicon source gas, an oxygen source gas, and a dopant source gas in said processing chamber, wherein~~ the dopant containing source gas ~~increases the~~ causes each of the plurality of optical cores to have a refractive index ~~of said optical core~~ above 1.46 and greater than a refractive index of the undercladding layer; and

depositing an uppercladding layer over the plurality of separated silicate glass optical cores.

38. (Currently Amended) The computer-readable storage medium of claim 37 wherein the oxygen source gas and silicon source gas are flowed to provide a ratio of oxygen atoms to silicon atoms ~~is~~ in the high-density plasma greater than 3:1.

39. (Currently Amended) The computer-readable storage medium of claim 37 wherein the dopant source gas is a nitrogen source gas, whereby ~~and~~ each of the plurality of optical cores comprises silicon, oxygen; and nitrogen.

40. (Original) The computer-readable storage medium of claim 39 wherein said nitrogen source gas is molecular nitrogen and the silicon source is silane.

41. (Currently Amended) The computer-readable storage medium of claim 40 wherein the ~~ratio of~~ molecular nitrogen is flowed into the process chamber at a rate ~~to silane is~~ between 0.5 and 5.0 times a rate at which the silane is flowed into the process chamber.

42. (Original) The computer-readable storage medium of claim 37 wherein the dopant source gas is a phosphorus containing gas or germanium containing gas.